

**CLAIMS:**

1. An improved irrigation seal assembly for a cascade-type substrate scrubber comprising in operative combination:

a) an idler bearing housing including sequential stepped bores, a first large bore for receiving an idler bearing and a smaller bore for receiving a piston, and a cleaning/rinsing fluid input port;

b) a slideable piston having a cylindrical body sized for sliding fit in said piston bore, and a disk-shaped flange at one end sized to fit in said idler bearing bore;

i) said piston having a central bore; and

ii) said flange having at least one recess in the outer face;

c) an idler bearing having an inner, rotatable race into which a brush mandrel is securable, and an outer, stationary race that is received in said idler bearing bore of said housing;

d) a mandrel securable in said bearing inner race for retaining cleaning brushes, having a central bore for fluid conduit to irrigate said brushes from the inside out;

e) said flange recess is positioned coordinate with the end of said mandrel to provide a controlled tolerance gap between the outer face of said flange and the end of said mandrel, said piston central bore is substantially equal to the bore of said mandrel bore, and said flange marginal edge contacts the outer stationary race of said idler boring so that pressure on said piston bears only on said outer race; and

f) said housing piston bore is axially longer than said piston to permit said piston to slide from an operating position adjacent the end of said mandrel to a retracted position to permit removal of said mandrel.

2. Improved irrigation seal assembly as in claim 1 wherein said flange recess provides clearance between said flange and said idler bearing inner race so that the tolerance gap provides a controlled leak of cleaning fluid from said piston bore out said bearing to divert wear particulates away from said mandrel fluid conduit bore.

3. Improved irrigation seal assembly as in claim 2 wherein said idler bearing outer race surface is concave to permit angular motion of said mandrel when removing said mandrel from said housing idler bearing bore.

4. Improved irrigation seal assembly as in claim 2 wherein said piston bore included a recess at its bottom to permit fluid pressure to cause said piston to move into said operating position from

said retracted position.

5. Improved irrigation seal assembly as in claim 2 wherein said flange recess is stepped.

6. Improved irrigation seal assembly as in claim 4 wherein said housing input port includes a radial bore communicating with said piston bore.

7. Improved irrigation seal assembly as in claim 6 wherein said piston end opposite said flange is chamfered to said piston bore.

8. Improved irrigation seal assembly as in claim 2 wherein said housing includes a seal member for sealing said housing in a scrubber assembly sump.

9. Method of reducing wear debris particulate contamination in rotating cascade scrubber brush irrigation systems wherein scrubber brushes are mounted on a rotateable mandrel including a central bore fluid manifold for providing cleaning or rinsing fluids to irrigate said scrubber brushes from inside out comprising the steps of:

a) maintaining clearance between the mandrel at the inlet of its bore and a fluid feed piston to reduce generation of wear debris particulates by rotation of said mandrel; and

b) providing a controlled tolerance leak path adjacent a source of wear contact between said rotateable mandrel and said fluid feed piston to flush wear debris particulates to the exterior upstream of the entry to said manifold bore.

10) Method of reducing wear particulate contamination as in claim 9 wherein said mandrel is journaled in an idler bearing housing containing said piston, and said piston seals against said bearing only along the outer race of said bearing.

11) Method of reducing wear particulate contamination as in claim 10 wherein said piston includes a fluid feed bore that is substantially equal in diameter with the diameter of the mandrel central bore and aligned therewith.